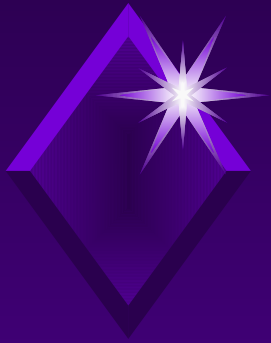# The Technical History of the Internet
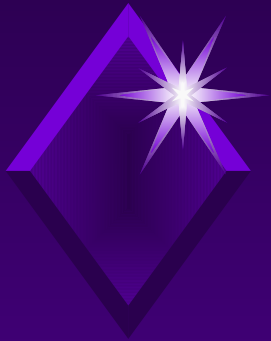
ACM SIGCOMM '99
August 31, 1999

Introduction/Global Context

- The REAL organizers: Chris Edmondson-Yurkanan, Ellan Zegura, Craig Partridge and Lyman Chapin

- Sessions may have some overlap in time frame

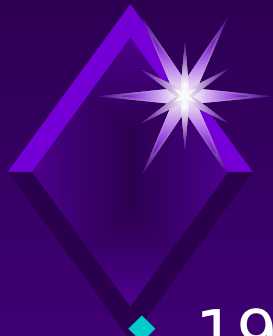- There isn't enough time for everything or even a small fraction, so don't get your pants in a bunch.

Approximate Time Line

- Session 1: 1960-1970 - "Laying the Foundation"
- Session 2: 1965-1980 "Building Early Packet Networks"
- Session 3: 1973-1983 "Creating the Internet and Developing Internet Standards"
- Session 4: 1980-1990 "Fixing the Internet -The Internet Shakedown Cruise"
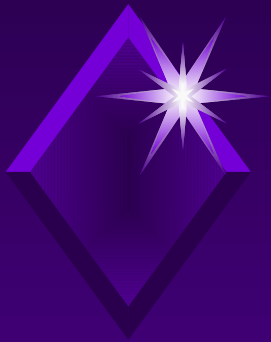- Session 5: 1986-1999 "Connecting the World - Reaching the Many; Connecting Different Networks"

The Context

- Packet Switching is a new idea (telco types gave it a -5 on a scale of 1-10)
- Computers are million dollar items and ARPA can't buy new ones every year but minicomputers have just arrived
- Time-sharing and inter-process communication are new ideas
- Personal Computers don't exist
- Networks are expensive

A Few Key Early Concepts

- 1961-1965 Kleinrock, Baran, Davies work on packet switching; Davies proposes a UK national network

- 1965 ff: Engelbart's NLS, hypertext, mouse

- 1966 - Roberts/Marill link two machines; first ARPANET concepts

- 1966 - Tymnet virtual circuits/frames www.mediacity.com/~norm/ETH.html

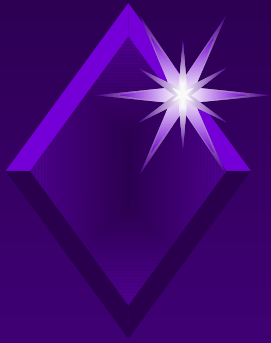- 1969 - BBN team delivers first IMP to UCLA - Kahn, Heart, Walden et al

More Early Dates

- 1970 - Host-Host NCP protocol developed by NWG led by S. Crocker. NIL/DEL (net interface language/decode-encode language) presage agents and Java
- 1970 - Alohanet at Univ Hawaii - Abramson, Kuo, Binder; link to ARPANET 1972
- 1971/72 - email ideas emerge, Tomlinson's @
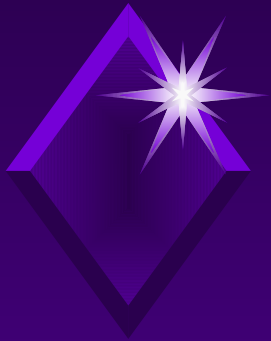- 1972 - ARPANET Demo at ICCC72 organized by Kahn; INWG formed

More Early Dates

- 1972 - FTP (works) and Data Reconfig flops
- 1973 - Metcalfe invents Ethernet at PARC
- 1971/73 - Roberts: Packet Satellite Net, Kahn: Packet Radio
- 1973/74 - First Internet papers by Cerf and Kahn for INWG and IEEE
- 1973-76 - Virtual circuits and X.25 origins (leading to Telenet, Datapac, PSS, Transpac)
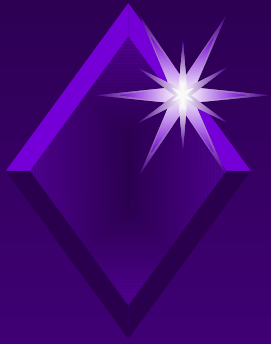- 1974 - Cyclades and Cigale (grasshopper) by Pouzin for IRIA in France

Reference Material

- Peter Salus, Casting the Net
- Katie Hafner and Matthew Lyon, Where Wizards Stay Up Late
- Janet Abbate, Inventing the Internet
- Stephen Segaller, NERDS 2.0.2 - A Brief History of the Internet
- Neil Randall, The Soul of the Internet
- Peter Denning, Talking Back to the Machine

Reference Material

- Tom Standage, <u>The Victorian Internet</u>
- Tracy LaQuey, <u>The Internet Companion</u>
- Carl Malamud, <u>Exploring the Internet</u>
- <u>Hobbes Timeline,</u> www.isoc.org/guest/zakon/Internet/History/HIT.html
- Barry Leiner, et al, "A Brief History of the Internet", www.isoc.org/internet/history/brief.html

Finding these slides

www.wcom.com/ cerfsup